

## **16 CULTURAL HERITAGE**

### **16.1 INTRODUCTION**

This chapter of the EIS sets out the potential impacts (if any) of the proposed amendments to the facility, as described in Chapter 1 on the Cultural Heritage aspect. It is considered that the primary archaeological impact assessment undertaken at the site in 2005 coupled with the results of recent monitoring of site stripping (2008-2009) are sufficient to determine possible impacts of the proposed amendments to the facility on the archaeology of the site and its environs. It is anticipated with the primary facility now constructed that minimal further stripping of the site will be required for the proposed amendments. This chapter therefore represents an update of the 2009 assessment to include the results of mitigation measures as implemented and any further mitigation measures now required.

During the period between October 2008 and January 2009, the site was stripped of topsoil in preparation for construction of the facility (completed in 2011). Some archaeological activity was identified by archaeologists monitoring the topsoil stripping works as was required by the Condition 10 of the grant of planning permission for the existing facility. These works were completed in February 2009. A summary of the assessment in 2005 along with the findings from the more recent surveys are presented in this chapter.

### **16.2 FIELD INSPECTION**

At the time of the site inspection in 2005, the site was composed of four fields bounded by hedgerows. No archaeological activity was recorded at the site. The site is located on the northern edge of a low-lying ridge, oriented N-S. It is overlooked by slightly higher ground in Cruicerath townland, immediately to the North; and by the Bellewstown ridge ca. 4km to the South.

The boundary of the facility encloses an area of 25 acres in extent, however the actual footprint of the buildings covers only approximately 10 acres of the site, with the remaining land utilised for landscaping to minimise the visual impacts of the facility. The proposed amendments to the facility are within the 10 acre footprint. The 2005 assessment considered the entire 25 acres.

### **16.3 DESK BASED RESEARCH**

The following field walking and desk based research was undertaken as part of the 2006 EIS;

- An assessment of Journal and documentary research -Various published sources and artefact corpora were consulted. These did not reveal anything of archaeological significance relating to the proposed development site.

- An assessment of Cartographic Research – A number of historical Ordnance Survey and other relevant maps were inspected. The timing of the formation of the various field boundaries was observed from historical Ordnance Survey Maps. Limestone deposits were noted between the railway line and the road. No other significant features were noted in the area.
- An assessment of Aerial Photography- no features of archaeological interest were identified on the proposed development site or in the immediate area.
- An assessment of the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP)- -Department of Environment, Heritage and Local Government- The SMR and RMP are lists of known archaeological sites compiled by the Archaeological Survey of Ireland from their files and from site visits carried out by archaeologists. The 2006 EIS study reviewed the SMR and RMP for each site. Where an archaeological site occurred all details were noted. There were no known archaeological sites recorded on the proposed development site in the Sites and Monuments Records. Four monuments were recorded in the vicinity. These comprised an Inland Promontory Fort at Platin (ME030-014), an Earthwork site at Cruicerath (ME027-002), a Soutterain at Bellewstown (ME027-006) and a Castle/Church at Platin (ME027-03).
- An assessment of the Topographic Files, Irish Antiquities Division, National Museum of Ireland- The townlands of Carranstown, Caulstown, Cruicerath and Newtown were searched in the Topographic Files of the National Museum of Ireland. Nothing was recorded as having come from the townland of Carranstown; one find was noted for Cruicerath (bronze pin dating from the early Christian period) and one from Newtown (a stone battle axe and stone hammer).

#### **16.4 INFORMATION FROM RECENT ARCHAEOLOGICAL MONITORING**

Monitoring of topsoil stripping by ADS was completed at the site in 2009. Five features were identified during the course of the works. Two were isolated pits, while the remaining three occurred in a cluster at the southwest of the site. Three of the features were archaeological and charcoal from these features was submitted for dating. The results of dating indicated that the features were late Neolithic and Middle Bronze age. A copy of their report is presented in Appendix 16.1.

#### **16.5 PREDICTED IMPACTS OF THE DEVELOPMENT**

##### **16.5.1 Direct Impacts**

The 2005 study and the findings from the monitoring of topsoil stripping identified archaeological activity on the proposed development site. Three of a total of five features identified were found to be archaeological comprising possible burnt mounds and a possible refuse pit with fire have been assessed recorded and documented by ADS.

Topsoil stripping is now complete and limited if any stripping will be required for the amendments proposed. It is therefore unlikely that construction works required by the proposed amendments will

have any impact on any further archaeological features which may survive below ground at the development site.

The physical impact of the development due to its proximity to the World Heritage Site of Newgrange was considered in the 2006 EIS. The facility is a minimum of 3km from the river valley and approximately 5km from the boundary of the World Heritage Site, sufficiently distant so as to render any archaeological impacts not significant. The UNESCO-ICOMOS monitoring mission which reported on the site in 2004, also considered the direct impacts and found that *there were no grounds for believing that the construction of the proposed incinerator itself would have a direct impact on the outstanding universal value of the World heritage site. Any effect on possible archaeological sites of local interest within the application area would be mitigated by archaeological monitoring*<sup>1</sup>

### 16.5.2 Indirect Impacts

A report entitled *Assessment Of Air Quality Impact Of Carranstown Waste Management Facility At Bru Na Boinne* was completed by AWN in March 2004. A USEPA approved air dispersion model was used to predict ground level concentrations at Bru na Boinne resulting from compounds emitted at the proposed facility at Carranstown. It was concluded that the impact of air emissions from the facility at Bru na Boinne will be insignificant. As is demonstrated in Chapter 7 Air Quality there is no significant change in the emissions from the development as modelled in 2006 and the proposed amended development. It has therefore not been necessary to reassess the impact on Bru na Boinne. A summary of the findings of this report is presented in Appendix 16.2.

## 16.6 REMEDIAL & MITIGATION MEASURES<sup>2</sup>

Although nothing of archaeological interest was noted during the field visit in 2005, a small number of archaeological features have been encountered during subsequent soil stripping works. The facility is situated in a region that was important in Irish pre-historic and historic times. Results of dating on features recorded at the site indicated they are prehistoric in age.

The fertile nature of this part of Meath also means it has been subject to intensive farming practices over a long period of time which may have resulted in the destruction of above ground archaeological features, traces of which may still survive beneath the present ground surface. Therefore it is recommended that:

- It is expected that no further topsoil stripping works at the site will be required. In the unlikely event that soil stripping is required, works will be monitored by a suitably qualified archaeologist as required by Planning Condition 10 of the existing planning permission.

<sup>1</sup> UNESCO-ICOMOS reactive monitoring mission report on the Archaeological Ensemble on the Bend of the Boyne (Ireland) 17-21 February 2004. p 3

<sup>2</sup> All archaeological recommendations are subject to the approval of the relevant statutory authorities.

- Should any archaeological discoveries be made during construction it is the responsibility of the finder, under the terms of the National Monuments Act (1930 & amendments), to immediately report their discovery to the Duty Officer of the National Museum of Ireland. Any archaeological discoveries should also be reported to the heritage authorities in the Department of Environment Heritage and Local Government.

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## Appendix 16.1

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# Final Report

on Archaeological  
Monitoring & Excavation  
at Carranstown, Co. Meath.

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**Client:** Indaver Ireland

**Author:** Dáire Leahy

**Date of Field Work:** September 2008–  
February 2009

**Submission Date:** November 2009



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## PLATES

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## ABSTRACT

Monitoring of topsoil removal was conducted prior to the construction of the Waste to Energy facility at Carranstown, Co. Meath. The monitoring was carried out between September 2008 and January 2009. A total of five features were uncovered during the course of the works and these were subsequently excavated between October and February 2009. Two of these were isolated, unrelated pits while the remaining three occurred in a cluster at the southwest of the site. Three of the features were archaeological and charcoal from these features was submitted for dating. The dates returned placed two of these features in the Late Neolithic and the third in the Middle Bronze Age. It is suggested that these features represent short term use of this portion of the landscape, related to more intensive use in the close vicinity.

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## 1. INTRODUCTION

Planning permission for the construction of a waste to energy facility at Carranstown, Co. Meath (Fig. 1) was received by Indaver Ireland in 2008 (Planning Ref. SA/60050). The first phase of works associated with the construction of the facility, involving topsoil removal and site preparation, began in September 2008 and continued until the end of January 2009. The excavation of the archaeological features was completed in February 2009.

As per condition 10 of the planning permission the presence of an archaeologist during all development works was required. The archaeological presence was initially provided by Eoin Corcoran and subsequently by the author for Archaeological Development Services Ltd (ADS).

## 2. REASONS FOR ARCHAEOLOGICAL MONITORING

The requirements of condition 10 of the planning permission resulted from the presence of a number of archaeological monuments in the close vicinity of the proposed development site. However, there were no known archaeological monuments within the area of the proposed development. The monuments in the vicinity included a possible burnt mound (ME027-028), an inland promontory fort (ME030-014), an earthwork (ME027-002), a souterrain (ME027-006) and the site of a church/castle.

Monitoring of the extensive works at the nearby Platin Quarry has, over the years, revealed a number of archaeological features. In 2002, monitoring revealed a burnt mound (Deehane 2002). That site was excavated in 2003 and the excavator recorded five pits, four possible structures, a trough and a burnt spread (Deehane 2003a). Further monitoring in 2003 (Deehane 2003b) uncovered a barrow (30540, 27117), two more burnt mounds, a medieval settlement (2003b & d), an enclosure, a Neolithic structure and various pits (Deehane 2003c). In 2004 another burnt mound and a series of prehistoric features containing pottery were excavated (Deehane 2004 & O'Carroll 2004).

In addition some stray finds have been found in the vicinity of Carranstown. A bronze pin (NMI reg. 1933:580) was found in a quarry at Cruicerath and a battle axe and hammer (NMI reg. L1934:7-8) were found near White Rock in Newtown.

## 3. THE DEVELOPMENT

The development is to consist of the construction of a 70 megawatt waste to energy facility that will include a main process building incorporating a waste reception hall, waste bunker operations, boiler/grate furnace, ash bunker, flue gas treatment building, associated

access galleries and a flue stack. In addition there will be a turbine unit, cooler building, pump-house building and water storage tank. Also to be constructed are an education centre/workshop/warehouse building, a transformer compound, contractor laydown area, car parking spaces, an electrical switch room and an on-site effluent treatment system. The development will also involve the realignment of the R152, along the road frontage of the site.

#### 4. SITE DESCRIPTION

The site is situated between the village of Duleek, to the southwest, and the Platin Cement factory, to the northwest. It is bounded on its east/southeast side by the R152 Duleek to Drogheda road. To the west and the immediate south the site is bordered by agricultural land.

Prior to the development the site comprised three fields, each planted with potatoes, and consisted of approximately 25 acres in total. Two fields occupied the southeast portion of the site and the remainder was occupied by a single, large field. Each of the fields were separated by hedge rows and an associated ditch. Between the site and the R152 the site was bounded by a low bank lined with mature trees and, towards the northeast end of the perimeter, by a concrete fence.

The land contained within the site was at its highest in the northeast corner, from where it sloped gradually to the south and southwest. To the west the slope increased leading to the base of a shallow, north to south oriented valley. The western boundary of the site coincided with the base of the valley and from here the topography rose again with the crest of this hill forming the horizon to the west of the site. To the northeast views were dominated by the extensive works at Platin quarry and cement factory. Vegetation lining a train line obscured the view to the north but prior to the construction of the train line the view would have been dominated by the rise of Cruicerath Hill to the northwest and Platin Hill to the northeast. More extensive views are offered by the low lying lands to the east of the site.

#### 5. MONITORING RESULTS

The monitoring of topsoil removal and site development works were carried out over a period of five months from the 4<sup>th</sup> of September 2008 to the 9<sup>th</sup> of February 2009. In addition to the removal of topsoil from across the site associated works included the removal of hedge rows, the cleaning out of drainage ditches and the construction of perimeter fences. All of these activities, where they had a subsurface impact, were conducted under archaeological supervision.

Due to the presence of a high voltage power line and a natural gas main, two linear areas of the site were not completely stripped of topsoil. The exceptions included two machine crossing points under the high voltage power line and a linear section, of approximately 80m, of the gas main which was partially excavated and protected with a layer of reinforced concrete slabs.

The removal of topsoil was completed using both tracked machines, fitted with toothless, grading buckets, and bulldozers. The depth of topsoil cover across the site varied between 0.1m at the southwest corner to 0.35m across the remainder of the site. It consisted of dark brown silty clay, becoming lighter towards the base where it became mixed with the underlying glacial till. This material consisted of light brown to orange gritty clay with occasional patches of grey to brown sand and fine gravel.

A total of five features were identified during the course of topsoil removal, namely two isolated pits and a cluster of three pits. The first two pits, in fields 1 and 2 were excavated on the 1<sup>st</sup> of October, while the final three pits, in field 3, were uncovered at the beginning of December and subsequently excavated on the 9<sup>th</sup> of February 2009. Each pit was assigned an individual context number; pit in Field 1: [2], pit in Field 2: [6] and the pits in Field 3: [9], [13] and [15].

## 6. EXCAVATION RESULTS

### 5.1 PIT [2]

This feature was located in Field 1, towards its northeast corner and hence was situated near the highest point on the site, at National Grid Reference (NGR) 306461 270890 (Fig. 2). The cut of this pit [2] was oval in plan with uneven, steeply sloping sides which sloped down to a rounded, elongated base (Fig. 3, Plate 1). It contained a series of three fills. The upper fill (3) consisted of light grey/brown, silty clay deposit with moderate charcoal flecking throughout the fill and occasional small stones. Below this was a second fill (4) which was dark grey, silty clay with frequent charcoal lumps. Several fragments of burnt clay were recovered from this fill. The basal fill of this pit, (5) consisted of light brown gritty, clayey silt with occasional charcoal flecking (Fig. 4, Plate 2). A burnt flint flake fragment was found within this fill.

### 5.2 PIT [6]

This feature was located, to the southwest of Pit [1], some 4m to the south of the field boundary separating fields 1 and 2 at NGR 306333 270813 (Fig. 2). The cut of this pit [6] was roughly circular in plan, with steeply to gradually sloping sides and a flat base (Fig. 5, Plate 3). It measured 1.2m by 0.95m in width, 0.11m in depth and contained two separate deposits (Fig. 6, Plate 4). The upper fill (7) consisted of very well compacted light brown gritty clay with occasional charcoal flecking and occasional stones. The basal fill (8) was

very compacted dark grey silty clay with moderate charcoal flecking and frequent angular stones, which may have been burnt. A possibly struck chert chunk was recovered from this fill.

### 5.3 PIT [9]

This feature occurred towards the southwest corner of the site at NGR 306177 270882. It was located approximately 10m northeast of pit [13] and 18m northeast of pit [15] (Figs 7 and 8, Plate 5). The cut of this pit [9] was roughly circular in plan with steeply sloping sides and a stepped base, with the western half of the pit having been c. 0.14m deeper than the eastern part. The pit measured 1.28 by 0.89m and from 0.2 to 0.34m in depth. It contained three fills. The upper fill (10) consisted of very compact light brown/yellow silty clay which extended across the western part of the pit and partly sealed the underlying deposit (11). This upper fill, (10), appears to have been a layer of redeposited natural subsoil. The fill (11) was visible prior to excavation in the eastern part of the cut. It consisted of moderately compact dark brown silty clay which was charcoal rich and had frequent inclusions of burnt angular stones. The basal fill (12) was sealed by (11) and partly sealed by (10) for approximately 0.15m to the west of the cut. This fill (12) consisted of moderately compact medium brown/grey clay with occasional charcoal inclusions and occasional burnt stones (Fig. 9, Plate 6).

### 5.4 PIT [13]

This feature also occurred towards the southwest corner of the site at NGR 306169 270877. It was located approximately 10m southeast of pit [9] and 5m northeast of pit [15] (Fig. 7). The cut of this pit was linear in plan with sharp vertical sides and measured 1.35m wide and was over 0.7m deep. A section was excavated through this pit but it was not excavated completely as it was interpreted as a modern machine cut trench. The pit contained a single fill (14) which was very loose brown/grey gravely sand that contained pockets of redeposited sod and clay. This fill contained a number of pieces of modern glass and coal (Fig. 10, Plate 7).

### 5.5 PIT [15]

This feature occurred at NGR 306153 270875. It was located approximately 18m southeast of Pit [9] and 5m southeast of Pit [13] (Fig. 7). The cut of this pit was linear in plan with sharp vertical sides and measured 1.5m wide and was over 0.6m deep. A section was excavated through this pit but it not excavated completely as it was interpreted as a modern machine cut trench. The pit contained a single fill (16) which was very loose brown/grey gravely sand which contained pockets of redeposited sod and clay. This pit appears to have been cut at the same time as pit [4] (Fig. 11, Plate 8).



## 7. DISCUSSION AND CONCLUSIONS

During the monitoring of topsoil removal and site preparation works a total of five features were identified, namely two isolated pits and a cluster of three pits. All of these features were fully resolved through excavation. Pits [2], [6] and [9] were archaeological in nature, while pits [13] and [15] appear to be modern machine-cut trenches.

Charcoal samples from each of the archaeological features were submitted to the <sup>14</sup>Chrono Centre at Queens University, Belfast and a radiocarbon date was returned for each of these samples.

The sample from pit [2] produced a date of 3010-2880 cal BC (UBA-12310, 2 sigma), placing the activity that produced this feature towards the beginning of the Late Neolithic period. Sample number UBA-12311, from the pit [6], produced a date of 2870-2580 cal BC (2 sigma), thereby placing the activity associated with this feature at a slightly later date and within a range covering the Late Neolithic. The last of the features, [9], produced a date of 1930-1770 cal BC (UBA-12312, 2 sigma) indicating that this was the result of activity dating to the Middle Bronze Age.

These dates are broadly reflected in the results of the lithic analysis which, despite the lack of diagnostic artefacts, suggested that this material was indicative of activity in the area in either the Neolithic or Bronze Ages (Leahy 2009, see Appendix IV). Only one of the excavated features, [2], produced lithic material and the Neolithic date from this feature may allow the other lithic artefacts, recovered from the topsoil, to also be assigned to this period. Indeed, the blade (08E670:1:2) was recovered from the topsoil adjacent to the pit [6] and this artefact is typical of those often produced by Neolithic technologies (Woodman *et. al.* 2006).

Two of the features, [6] and [9], contained burnt and heat shattered stone, a type of material that is usually associated with the site-type known as burnt mounds or *fulachta fiadh*. These sites consist of mounds of burnt and heat shattered stone generally associated with a trough which acted as a water container. Stones were heated in a fire and dumped into the water for the purpose of heating the water. A range of uses for this hot water have been suggested that include, among others, cooking, bathing and brewing. Sites of this type generally date to the Bronze Age (Brindley & Lanting 1990) but earlier examples, with Neolithic dates, are also known (FitzGerald 2007).

These were isolated pits without associated features or mounds of burnt stone and, as such, do not correspond with the classic description of these sites. However, it may be that these two features represented the employment of this technology on a very limited basis, with each pit having functioned as a trough but only a small number of occasions.

The pit feature that did not contain burnt stone, [2], did however contain significant quantities of charcoal, and also burnt clay, suggesting that it, at least partially, contained material from a fire spot/hearth.

While little can be said in regard to the specific function of these pits, they are indicative of the non-intensive use of the landscape in an area that, in the form of the monuments of Brú na Bóinne to the northwest, shows the signs of intensive use during the Neolithic and the Bronze Age. Sites dating to both these periods were excavated, to the northwest, at the Platin quarry (e.g. Deehane 2002 & 2003c) and there is a strong possibility that the features excavated at Carranstown represent the remains of activity related to these sites.

Taken in isolation the significance of these features does not seem overwhelming. However, it is suggested that their importance lies in their ability, when dated, to illustrate an aspect of the use of the landscape in prehistory that may, more often than not, be effectively ignored. Such features are often thought to be too insignificant to warrant a radiocarbon date and they, thereby, lose their archaeological value. These features are aspects, and evidence, of the wider use of the landscape outside of the more easily recognised 'sites', that result from more intensive activity. These features could be the remains of temporary settlement, used by people, moving through the landscape, from one location to another or perhaps the remains of a cooking event or camp fire used by those responsible for the activity uncovered at the quarry.

This use of the landscape, on a more informal, short term and casual manner helps to extend and elaborate on the picture of prehistory that archaeology can paint, and it is here that the value of the features excavated at Carranstown lies.

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## 9. APPENDIX I: CONTEXT LIST

Context	Description of Context
1	Topsoil. Dark brown silty clay that covered the entirety of the site.
2	Cut of pit. Irregular in plan with steeply sloping sides and a rounded base. It measured 1.04 by 0.8m in width and 0.45m in depth. Filled by deposits (3), (4) and (5).
3	Upper fill of [2]. Light grey/brown silty clay with moderate charcoal flecking and occasional stones (0.04m <sup>3</sup> ). It measured 0.41 by 0.5m in width and 0.14m in depth. Overlay (4).
4	Fill of [2]. Dark grey silty clay with very frequent charcoal flecking. It measured 0.9 by 0.78m in width and up to 0.2m in depth. Overlay (5). Contained burnt clay
5	Basal fill of [2]. Light brown gritty clayey silt with occasional charcoal flecking. It measured 0.9 by 0.5m in width and 0.25m in depth. Contained burnt flint flake.
6	Cut of pit. Oval in plan with gradually sloping sides and a flat base. It measured 0.95 by 1.2m in width and 0.1m in depth. Filled by (7) and (8).
7	Upper fill of [6]. Well compacted light brown gritty clay with occasional charcoal flecking and occasional stones (0.04m <sup>3</sup> ). It measured 0.55 by 0.63m in width and 0.04m in depth. Overlay (8).
8	Basal fill of [6]. Compact dark grey silty clay with moderately frequent charcoal flecking and frequent angular stones (possibly burnt- 0.04-0.11m <sup>3</sup> ). Contained a chunk of possibly struck chert.
9	Cut of pit. Subrectangular in plan with steeply sloping sides and a flat, stepped base. It measured 0.89 by 1.28m in width and between 0.2 and 0.34m in depth. Filled by (10), (11) and (12).
10	Fill of [9]. Compact light brown/yellow silty clay with occasional pebbles. It measured 0.53 by 0.98m in width and 0.25m in depth. Overlay (11).
11	Fill of [9]. Moderately compact dark brown silty clay with frequent charcoal flecking and frequent fragments of burnt and heat shattered stone. It measured 0.6 by 0.66m in width and 0.34m in depth. Underlay (10) and overlay (11).
12	Fill of [9]. Moderately compact mid grey/brown clay with occasional charcoal flecking and occasional fragments of burnt and heat shattered stone. It measured 0.4 by 0.89m in width and 0.1m in depth. Underlay (11).
13	Cut of pit. Not fully excavated. Subrectangular in plan with rounded corners and steeply sloping/vertical sides. It measured 1.35m in width and 2.8m in length. Filled by (14).

Context	Description of Context
14	Fill of [13]. Loose, grey/brown gravelly sand with pockets of sod and clay. It measured 1.5m in maximum width and 0.7m+ in depth. Contained modern glass and coal.
15	Cut of pit. Not fully excavated. Subrectangular in plan with rounded corners and steeply sloping sides. It measured 1.5m in maximum width, 5.1m in length and 0.5m+ in depth.
16	Fill of [15]. Loose, grey/brown gravelly sand with pockets of sod and clay. It measured 1.5m in maximum width, 5.1m in length and 0.5m+ in depth.

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## 10. APPENDIX II: SAMPLE LIST

<b>Sample No.</b>	<b>Context No.</b>	<b>No. of bags</b>	<b>Reason for sampling</b>
1.	4	1	Charcoal for radiocarbon dating
2.	8	1	Charcoal for radiocarbon dating
3.	11	1	Charcoal for radiocarbon dating

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## 11. APPENDIX III: FINDS LIST

Context No.	Find No.	Type	Description
1	1	Flint	Broken flint scraper
1	2	Flint	Flint blade
1	3	Flint	Retouched flint flake
1	4	Flint	Flint debitage
4	-	Clay	Several fragments of burnt clay
5	1	Flint	Fragment of burnt flint flake

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## 12. APPENDIX IV: REPORT ON LITHIC ARTEFACTS FROM CARRANSTOWN, CO. MEATH, 08E0670.

Dáire Leahy B.A., October 2009.

A total of five lithic artefacts were recovered during the course of monitoring of topsoil striping and during the excavation of an archaeological feature, at Carranstown, Co. Meath (Licence Number 08E0670). These artefacts consisted of 3 retouched artefacts, 1 flake and 1 piece of angular shatter. All of the artefacts were of flint.

### 11.1 METHODS

All lithic material recovered was subjected to an initial visual inspection in order for the non-archaeological material to be identified and removed. This was followed by a detailed examination and the creation of an Excel spread sheet catalogue of the material.

Each artefact was recorded on the basis of a number of criteria, i.e. find number, raw material, artefact type, length, breadth, thickness, platform type, platform depth, completeness, condition, patina and platform preparation. Retouched artefacts are also individually described, detailing the nature and location of the retouch. All of this information is presented in the catalogue in section 11.7, at the rear of the report.

Each report details the specific nature of each assemblage based on the artefact types contained within it. The composition of the assemblage, variety within artefact types, the size range of the material and other attributes are illustrated, where relevant, with the use of charts. Where charts are used to illustrate the size range of various artefacts, only complete artefacts have been included. Each assemblage is then discussed and, where possible, dated.

The terminology and classifications used are based on those presented in Andrefsky (1998) and Woodman *et. al.* (2006).

### 11.2 RETOUCHE ARTEFACTS

There were 3 retouched artefacts in the assemblage (08E0670:1:1, 2 & 3), all of which were recovered from the topsoil. Find number 1:1 was a fragment of the retouched edge of a concave scraper that had been broken at some time following the application of the retouch. The retouch was direct, i.e. applied to outer, dorsal surface of the object, and was abrupt and semi-invasive. No other features were preserved on this artefact.

Find number 1:2 was a well made retouched tertiary blade flake. It had generally parallel sides with retouch to both the left and right lateral margins and to the proximal end. The retouch on the lateral margins was alternating, i.e. alternately switching between the dorsal and proximal surfaces, and was abrupt and short. On the left lateral margin the



retouch, applied to the ventral surface, had produced a notch, mid way along the margin, forming a concave scraping surface. This notch was 3.2mm in depth and 11.9mm in width. The retouch applied to the ventral side of the proximal end had removed the striking platform on this artefact. Although recovered from the topsoil this artefact was recovered in close proximity to the pit [2].

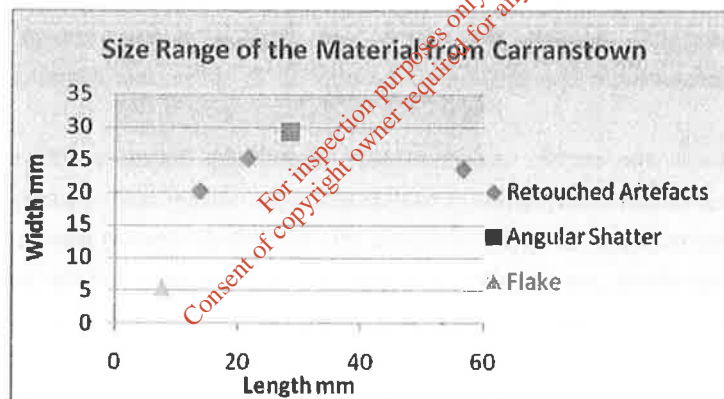
The third scraper was formed on a secondary flake with rough, abrupt, short retouch applied to the dorsal surface on the right lateral margin. It had a plain striking platform that had been prepared prior to the removal of the flake from its core.

### 11.3 THE FLAKE

This very small flake was recovered from a fill of the pit [2]. It was a tertiary flake, i.e. with no cortex on the dorsal surface and it had been burnt prior to its deposition.

### 11.4 ANGULAR SHATTER

This artefact was a piece of non-flake waste from the knapping process with no features on its surface to allow a more precise classification or interpretation.



### 11.5 DISCUSSION AND DATING

All of the artefacts recovered from Carranstown were of flint. Only 2 of the artefacts exhibited dorsal cortex and in both cases this was indicative of the use of water-rolled pebbles as raw material. This material could have been sourced either from local glacial or fluvial deposits.

With the exception of the flake, the only artefact from a sealed context, the material was slightly weathered and one artefact, the retouched blade, had a small area of light white patina. These attributes were consistent with the context in which they were found, i.e. the topsoil, where they may have been disturbed, moved and exposed to the elements.

The artefacts represent both elements of primary and secondary technologies, i.e. the products of the knapping process (primary) and retouched artefacts (secondary). This

could be suggestive of the production, use and discard of such artefacts on this site. However, given the disturbed context from which the majority of the material was recovered, these artefacts may have been the product of several separate lithic technologies. The plain, and relatively deep, striking platform on the scraper 1:3 is indicative of the use of a direct hard hammer technique of flake removal being employed in this case. But, as striking platforms were absent from the remainder of the assemblage, it was not possible to assess whether this method was used in their removal.

None of the artefacts were indicative of the practise of any one specific activity at the site and the 3 scrapers could have been employed in a range of cutting or scraping activities and they are typical of the general purpose tools often recovered from a Irish prehistoric sites of varying dates. As none of the artefacts were diagnostic the material is difficult to assign to any specific period in the prehistoric period, and indeed, given the recovery of lithics from medieval contexts (Edwards 1990) some of the material (i.e. the angular shatter and perhaps the rough scraper 1:3) could as much be the product of medieval technologies as prehistoric ones. However, given the similarity of the retouched blade and the scraper fragment to those recovered from sites such as e.g. the court tomb at Aghnaskeagh, Co. Antrim (Herity 1997), it is suggested that a date for this material, either in the Neolithic or the Bronze Age is likely. However, as most of the material was recovered from the topsoil, in a number of locations across the site, and as the only artefact from a secure, and as yet undated context was the least diagnostic of these, these lithics can only be interpreted as an indicator of activity in the area in prehistory.

#### 11.6 BIBLIOGRAPHY

Edwards, N. 1996 *The Archaeology of Early Medieval Ireland*. London & New York. Routledge.

Herity, M. 1987 The Finds from Irish Court Tombs. *Proceedings of the Royal Irish Academy* **87C**, 103-281.

Woodman, P. C., Finlay, N. and E. Anderson 2006 *The Archaeology of a Collection: The Keiller-Knowles Collection of the National Museum of Ireland*. National Museum of Ireland Monograph Series 2. Bray. Wordwell.

11.7 Lithic Catalogue

Find Num	Raw Material	Retouched Artefacts	Tertiary Flakes	Blades	Angular shatter	length	Breadth	Thickness	Platform Type	Platform Depth	Complete	Condition	Patina	platform preparation	Bipolar?	Comment
08E670:1:1	Flint	1				13.7	20.3	6.9			no	Slightly Weathered	none			A fragment of the scraping edge of a concave scraper with direct, abrupt, semi-invasive retouch.
08E670:1:2	Flint	1				56.6	23.6	6.7			yes	Slightly Weathered	light white		no	Retouched tertiary blade flake with alternating, abrupt, short retouch to both lateral margins, also a retouched notch on the left lateral margin. Also indirect, abrupt, semi-invasive retouch to proximal end that removed the striking platform
08E670:1:3	Pebble Flint	1				21.6	25.2	9.7	plain	3.5	yes	Slightly Weathered	none	yes	no	Side scraper formed on secondary flake with rough, direct, abrupt, short retouch to the distal end of the right lateral margin.
08E670:1:4	Pebble Flint				1	28.5	29.3	9.4			no	Slightly Weathered	none			
08E670:5:1	Flint		1			7.6	5.4	1			no	burnt				Proximal and distal ends missing.

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13. SUMMARY OF THE RADIOCARBON DATES

<sup>14</sup>Chrono Centre, Queens University Belfast.

**UBA-12310**

Radiocarbon Age BP 4301 +/- 23

Calibration data set: intcal04.14c

% enclosed	area	cal AD ranges	age	# Reimer et al. 2004 relative area under probability distribution
68.3 (1 sigma)		cal BC 2914- 2895		1.000
95.4 (2 sigma)		cal BC 3007- 2991		0.030
		2930- 2884		0.970

**UBA-12311**

Radiocarbon Age BP 4124 +/- 27

Calibration data set: intcal04.14c

% enclosed	area	cal AD ranges	age	# Reimer et al. 2004 relative area under probability distribution
68.3 (1 sigma)		cal BC 2857- 2829		0.203
		2823- 2811		0.086
		2749- 2723		0.177
		2699- 2626		0.534
95.4 (2 sigma)		cal BC 2866- 2804		0.271
		2776- 2768		0.013
		2764- 2580		0.716

**UBA-12312**

Radiocarbon Age BP 3529 +/- 22

Calibration data set: intcal04.14c

% enclosed	area	cal AD ranges	age	# Reimer et al. 2004 relative area under probability distribution
68.3 (1 sigma)		cal BC 1904- 1874		0.398
		1843- 1816		0.350
		1799- 1779		0.252
95.4 (2 sigma)		cal BC 1930- 1859		0.271
		1853- 1772		0.444

## FIGURES & PLATES

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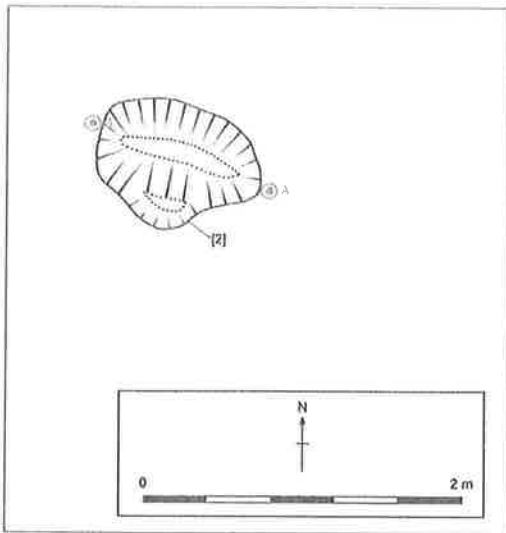


FIG 3: Post-excavation plan of [2]

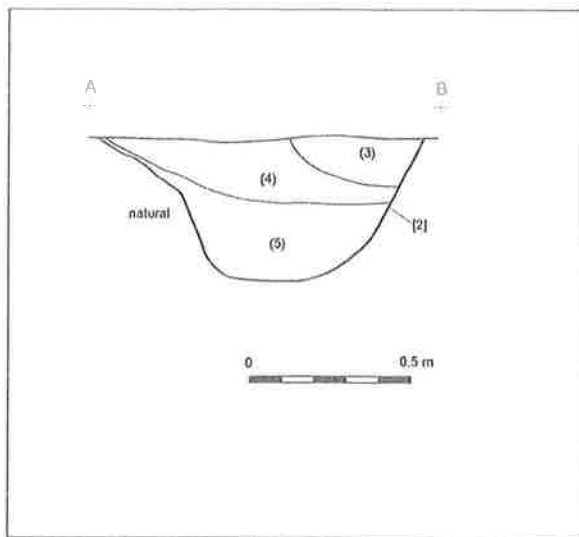


FIG 4: Northeast facing section through [2]

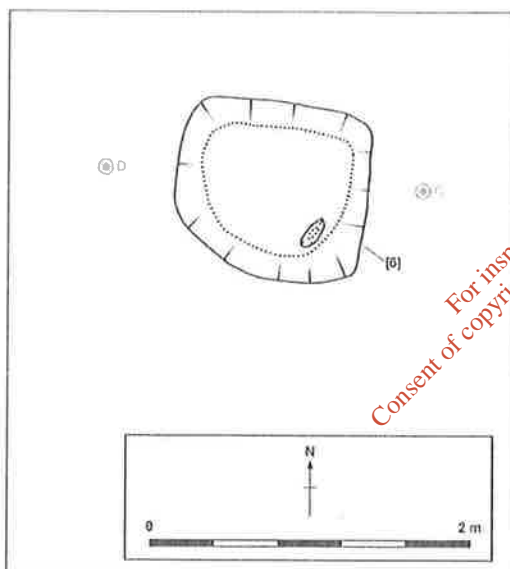


FIG 5: Post-excavation plan of [6]

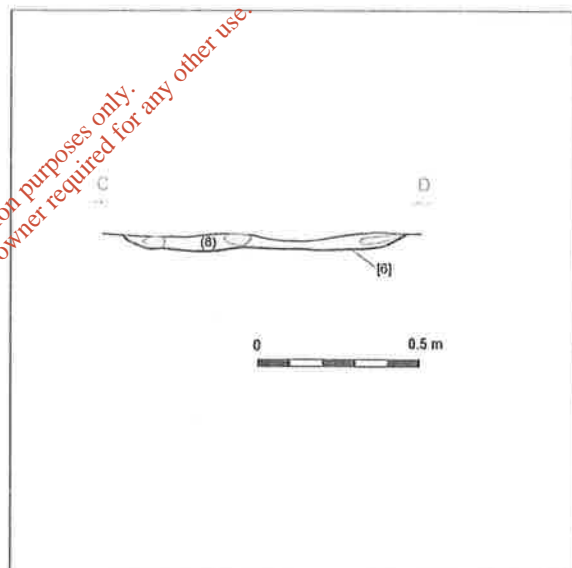


FIG 6: North facing section through [6]

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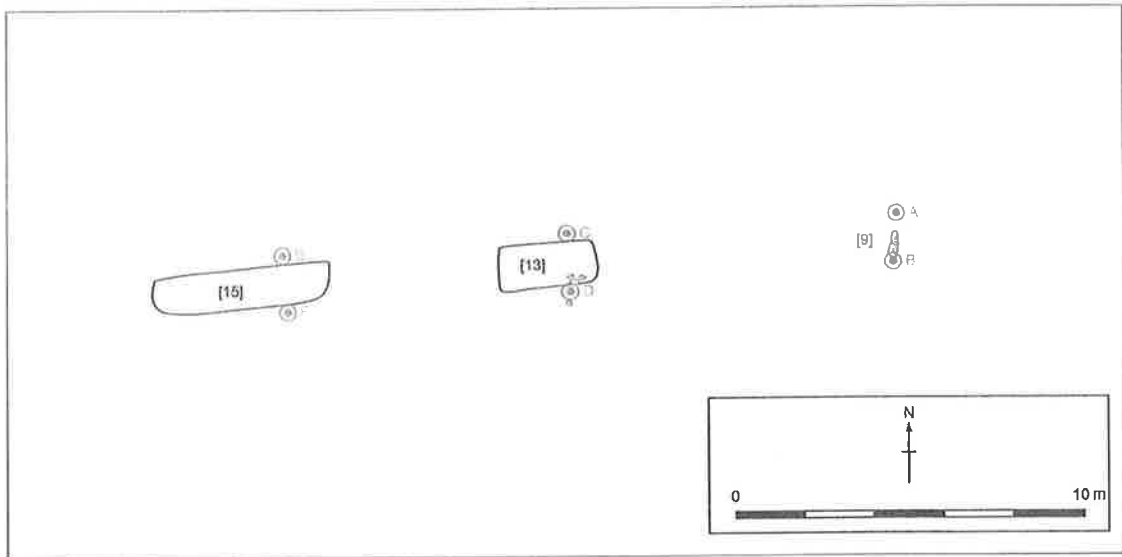


FIG 7: Pre excavation plan of [9], [13] and [15]

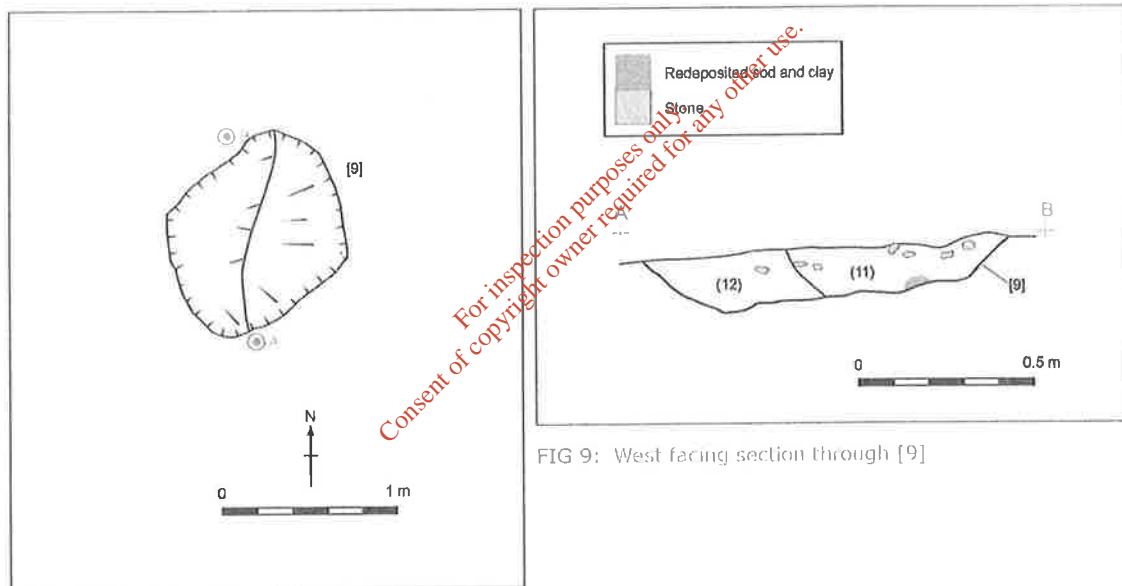


FIG 9: West facing section through [9]

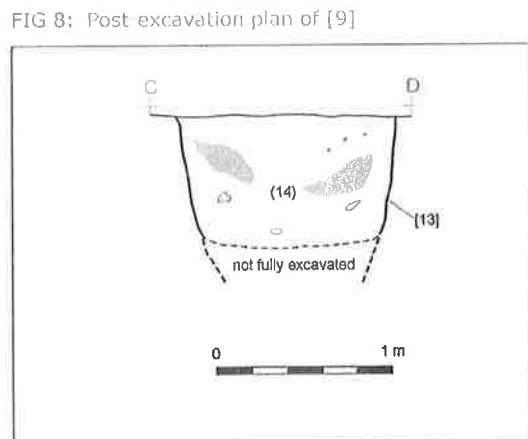


FIG 10: West facing section through [13]

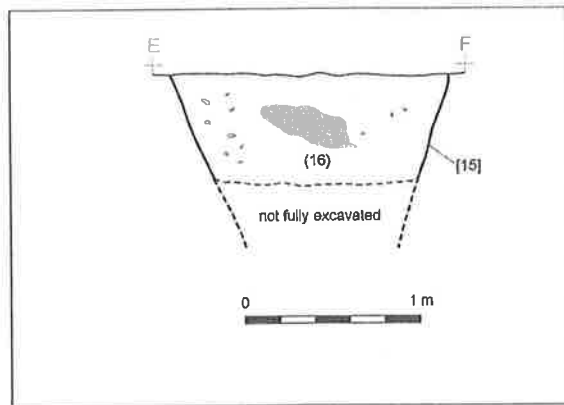


FIG 11: West facing section through [15]



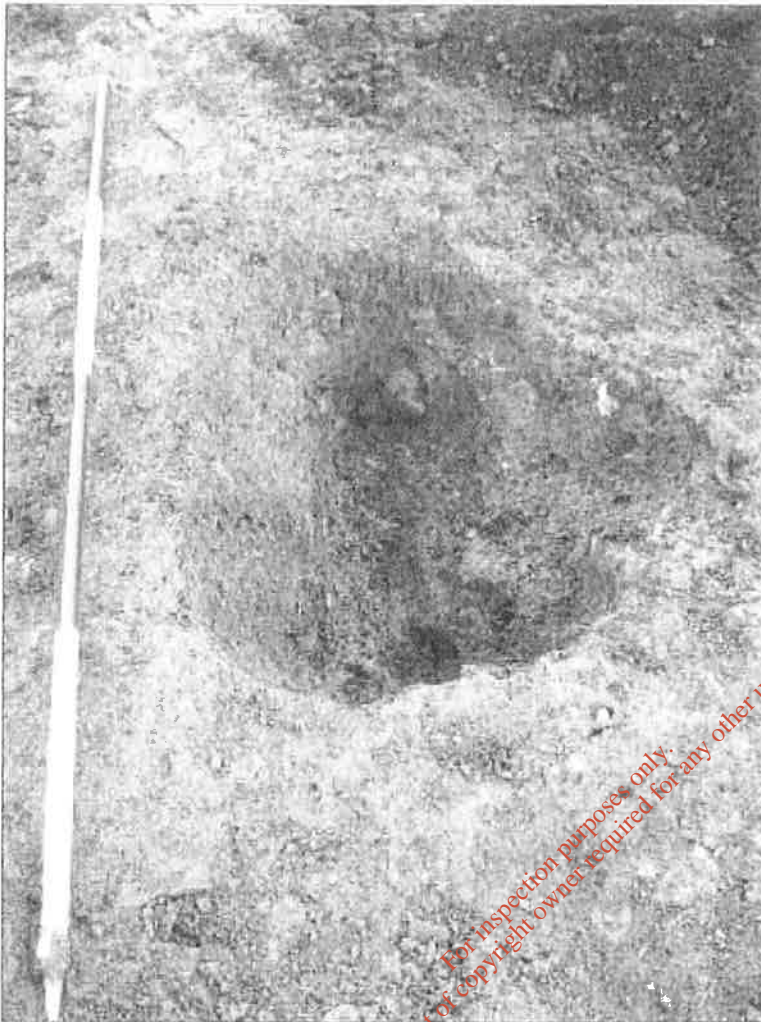


PLATE 1: Post-excavation shot of [2], from the northwest

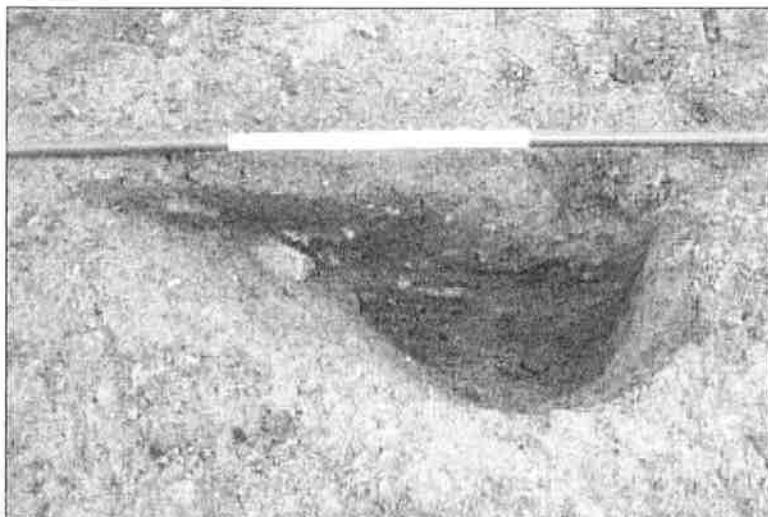


PLATE 2: Northeast facing section through [2]

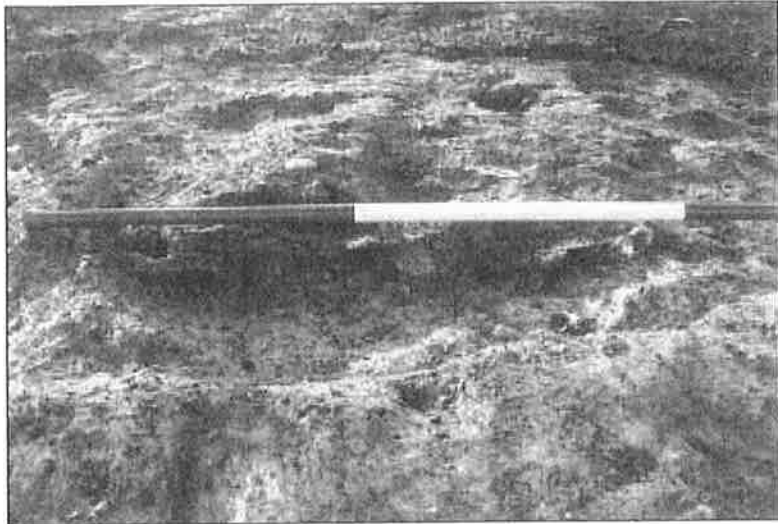


PLATE 3: Post-excavation shot of [6], from the from the north

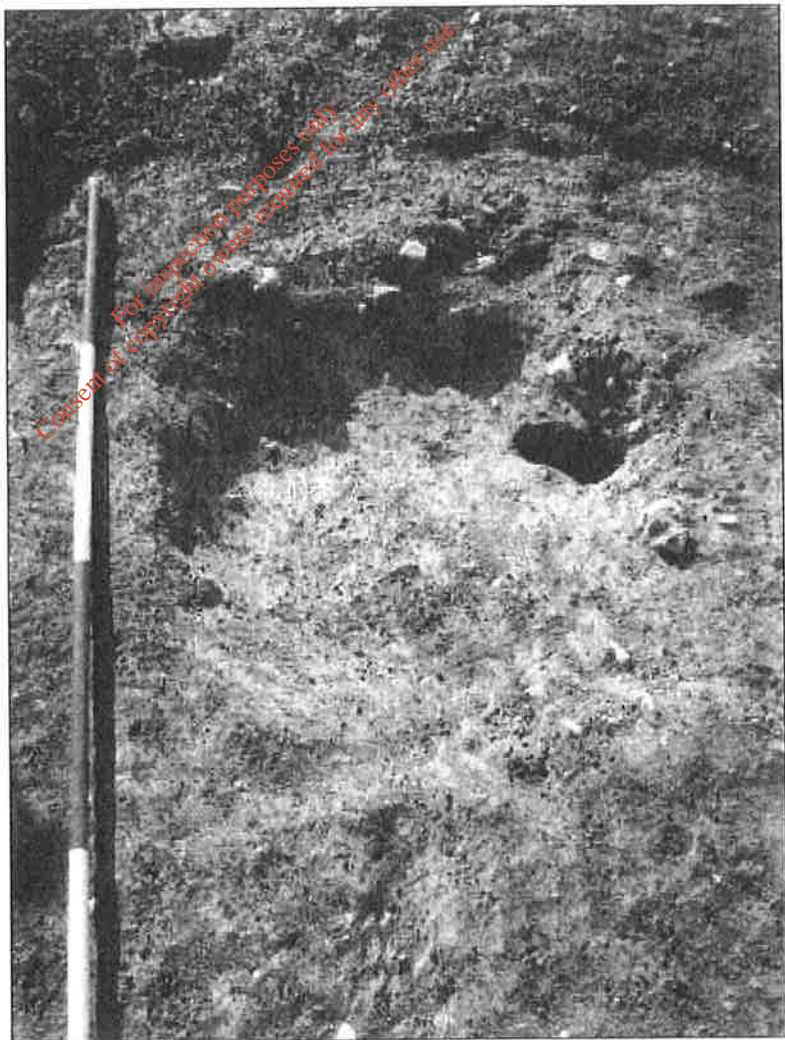


PLATE 4: North facing section through [6]

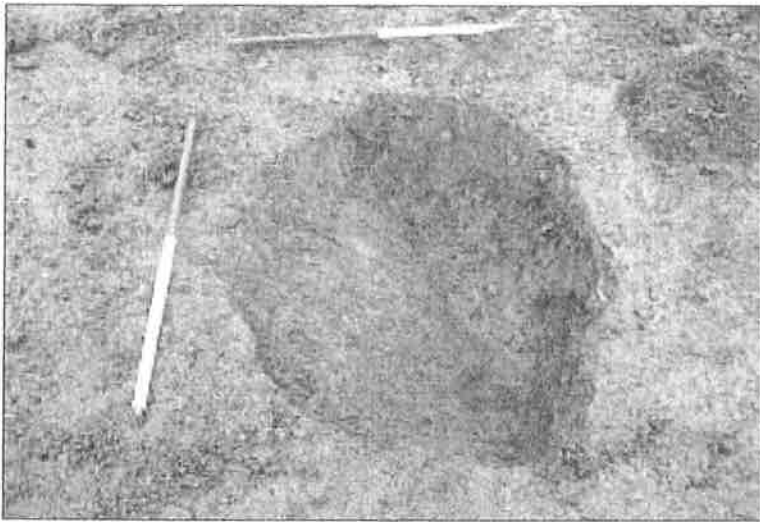


PLATE 5: Post-excavation shot of [9] from the northwest

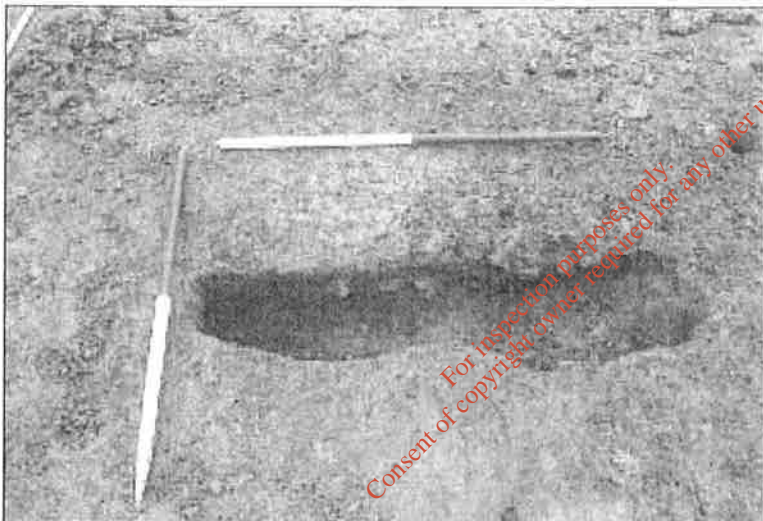


PLATE 6: Northeast facing section through [9]

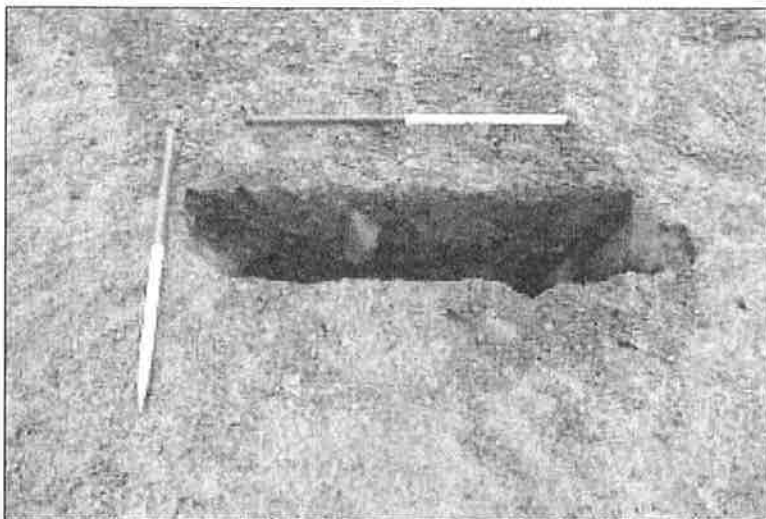


PLATE 7: West facing section through [13]

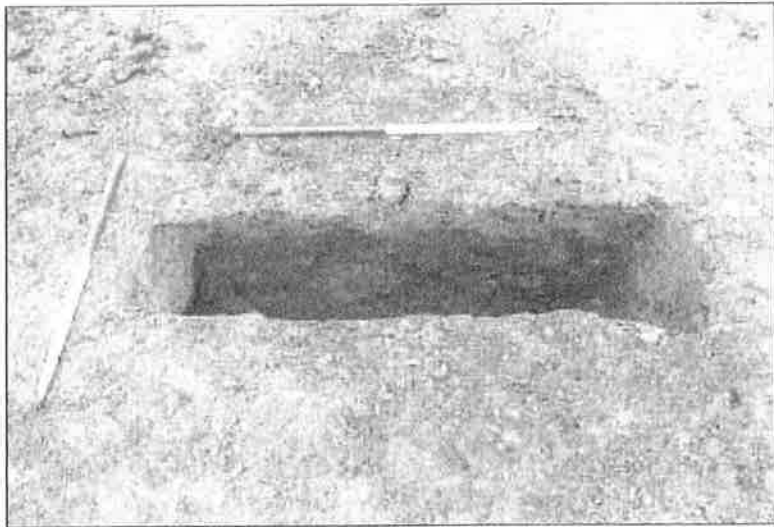


PLATE 8: West facing section through [15]

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## Appendix 16.2

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## Summary Of Air Impacts At Brú Na Boinne

The United States Environmental Protection Agency (USEPA) approved AERMOD dispersion model has been used to predict the ground level concentrations (GLC) at Brú na Boinne resulting from compounds emitted from Carranstown Waste Management Facility.

Modelling results for the facility indicate that the ambient ground level concentrations at Brú na Boinne resulting from the Waste Management Facility are significantly below the relevant air quality standards for all species. The results for NO<sub>2</sub> indicate that levels at Brú na Boinne reach only 1% of the limit value. With regard to SO<sub>2</sub>, the predicted levels at Brú na Boinne will reach at most 0.5% of the limit value, and for all other species modelled, the predicted levels at Brú na Boinne will reach less than 1% of their respective limit values.

Levels of all species are significantly lower than the Human and Ecosystem Standards set by the EU and other European bodies. Thus, the impact air emissions from the Carranstown Waste Management Facility at Brú na Boinne will be insignificant.

Although there are no specific EU standards relating to the maximum levels of ambient air pollutants on stonework or historical monuments, the focus has been on reducing the emissions of the precursors to acid rain such as NO<sub>x</sub>, SO<sub>2</sub> and VOCs. The 1999 Gothenburg Protocol to the Convention on Long-range Transboundary Air Pollution, is one such agreement which has set stringent emissions ceilings for NO<sub>x</sub> and SO<sub>2</sub> (emissions of SO<sub>2</sub> and NO<sub>x</sub> will be reduced by 76% and 43% compared to 1990 levels by 2010). This Protocol has recently been passed into Irish legislation as S.I. No. 10 of 2004. To put the current facility in context, emissions of NO<sub>x</sub>, SO<sub>2</sub> and VOCs from Carranstown Waste Management Facility will reach at most 0.4% of their National Emissions Ceilings in 2010.